#  Where Physics Can Take Me (WPCTM)



# Aim

To highlight the vast range of careers that studying physics and physics skills can lead to.

# Learning outcomes

By the end of the session, each mentee will be able to…

* …recall 4 careers that physics can lead to,
* …describe how these roles use physics in them,
* …identify one link between a career they want to do and physics,
* …reflect on their participation in the session.

## Prepare in advance

* Anything you have told your mentees that you will be bringing along from previous sessions e.g. Results from activities, or follow up questions
* Post to the Teams/Google Classroom channel for the mentees:
	+ A reminder of date/time of the session
	+ A list of things need access to:
		- Sound when watching videos,
		- Pen and paper
	+ Processes for certain things, e.g.:
		- Asking Qs
		- Using the Teams channel
		- Raising issues with mentor or teacher
* Upload the “Where Physics Can Take Me” video and worksheet to the Teams/Google Classroom space. The worksheet is available as both a fillable PDF and a Google Form (this might be better for students using a phone). Teachers might like to print out the worksheets for students to fill out with a pen, but this will need to be prepared ahead of time.

## Timings

|  |  |  |
| --- | --- | --- |
|  5 min |  | Introduction and Icebreaker incl. reminder of Ground Rules |
| 25 min |  | WPCTM video and worksheet |
| 5 min |  | Answers and discussion |
| 5 min |  | Mentees’ careers and aspirations |
| 5 min |  | Reflection and Summary |

## Equipment needed

*What do you need to run this session smoothly? Where will you get this?*

* PowerPoint presentation
* Where Physics Can Take Me video
* Where Physics Can Take Me worksheet – either PDF, link to google form or printed by teacher
* Mentee reflection form link
* Mentor reflection form link

## Introduction

*How will you introduce the aims, learning outcomes and activities to the students?*

### Icebreaker

* Lead mentor and co-mentor re-introduce selves (name, pronouns, course, university).
* Ask the mentees to write in the chat, without pressing send, the following. Give them ~1min to do so:
	+ “What careers do you think link to physics?”
* At the end of the time, ask all the mentees to press send. Then, lead and co-mentor to read the answers out loud. You can have some discussion, but we will be returning to this question at the end of the session, so there is no need to encourage discussion yet.
* Do the above again, and this time ask:
	+ 1. What job do you want to do?
	+ 2. Do you think it links to physics?

Encourage the mentees to write as many jobs as they might consider – and encourage them to be ambitious!

* If you have mentees that don’t know what they want to do, reassure them that this is totally okay and that ambitions and goals often change over time. Encourage them to think of a career they might be interested in so that they can participate, but you may also want to highlight the resources listed below in “Skills used and possible relevant careers”.
* Read out loud/comment on answers given and thank mentees for their contribution - don’t elaborate on their answers too much at this stage (e.g. particularly if they don’t think that career links to physics) as we will revisit the links to physics at the end of the session.

### Reminder of Ground Rules

* Remind mentees the ground rules you have been working with in our sessions.
	+ If any have been any rules which have been particularly important or regularly broken then in particular draw attention to these. **Tip:** It can be useful to focus on and give examples of good behaviour you want to be seeing (rather than what you don’t want to be seeing). If possible, illustrate with examples from previous sessions e.g. “Last week when we did X, you all gave me loads of really fantastic answers in the chat and were really polite to one another – I’m excited to see that behaviour again and to hear what you have to say this week!”
	+ You may also want to invite the option to provide new ground rules if there is anything the mentees want to add.

## Activities

### WPCTM video and worksheet

* Ensure every mentee has access to a worksheet (printed, online fillable PDF, or online form)
* In the video, each person will speak twice – the first time they speak, they will not reveal the job they do, instead talking about the skills they use, what their working environment is like etc.
* The aim of this exercise is for mentees to watch the video and guess the job role of the individuals speaking in it. The job roles will be revealed in the second half of the video.
* Watch the video with your mentees.
	+ Ensure all mentees can hear the audio sufficiently – you could ask them to post an emoji in the chat for example.
	+ You might find it useful to pause in between each person to allow mentees time to take notes. Ask mentees to write a comment or share an emoji in the chat once they have made a guess about the career.
	+ After the students have made their guesses, you can play the second half of the video all the way through without pausing.
	+ Your mentees might find it useful if you type the names of the careers into the chat box at the end of the video. E.g. Rachel – Radiographer; Bryn – Head Chef; Rachel – Lecturer; Trevor – Client Manager; James – Filmmaker; Jon – Science Communicator, Author, Rapper.
* Video time codes:
	+ First Half (Clues)
		- Rachel – 00:00
		- Bryn - 01:33
		- Rachel – 03:02
		- Trevor – 04:47
		- James – 06:21
		- Jon – 07:58
	+ Second Half (Answers)
		- Rachel – 09:50
		- Bryn – 11:30
		- Rachel – 12:53
		- Trevor – 14:20
		- James – 15:37
		- Jon – 17:03

### Video answers and discussion

* Check understanding – ensure the mentees understand what every job is and clarify if they do not.
* Ask your mentees to share their thoughts on the video. Ask them to write in the chat, without pressing send, their answer to one of the following prompt questions. Give them ~1min to do so:
	+ What did you think of the jobs in that video? Which job would you like to do most and why?
	+ Were you surprised that any of the careers linked to physics? If yes, which person or career surprised you, and why?
	+ What did you think about the jobs in the video? What physics skills did they use?
	+ Do you know any people that do a job like this?

Discuss the responses that your mentees write in the chat and thank them for their responses.

* Linking Physics to the careers.
	+ Your mentees might have been surprised that some of these careers link to physics. You might like to speak about some of the careers in depth a little more, bringing out the physics skills mentioned.

### Mentees’ careers and aspirations

* Return to the questions you asked your mentees to respond to at the beginning of the lesson (“What job do you want to do? Do you think it links to physics?”). It might be likely that some of the responded “no” to the second question. Ask your mentees whether they would change that response now, following the video.
* If mentees still say that the job they would like to do does not link to physics, help them, or ask the other mentees to help them, think of a link between their job role and physics.
* You do not have to link all the jobs to physics, but if you cannot think of a link, you might want to note down the careers your students would like to do and return next week with a link between the jobs that interest them and physics or physics skills.

## Reflection

Give the students the link to the Reflection form you have been using each week. You can remind them that:

* they will do it every week,
* you will use it to improve sessions and make sure that you include content that is fun and relevant to the mentees, and
* they should use it as an opportunity to think about what they have learnt in the session and discuss it with each other.

Encourage the mentees to think about what they learnt in the session, what they learnt about themselves, what they were surprised about, if they were confused about anything and what they did or didn’t enjoy.

You should have already seen some reflection from these students. If there are comments the mentees have made previously which have been particularly rich, then encourage them to continue doing this.

Share this week’s prompt questions:

* “Did you enjoy talking about physics careers? Did anything surprise you?”
* “What jobs would you like to do? It easy to think of how that job links to physics?”
* “Did you enjoy today’s session? What would you have changed if you were the mentor?”
* “Do you think doing physics will help you to reach your dream career?”

## Extension ideas

Given the video takes quite a long time to watch and work through together, it is unlikely that there will be much time for extension activities in this session.

Physics Skills: If you think some mentees might become distracted, you could provide them an extra task: for example, ask two different students or teams to write down all the physics skills mentioned in the video. You can compare the lists at the end to see who got the most.

Other jobs that link to physics: Ask a student to think of a number of careers they see in their day-to-day life – they could be the jobs that their family members have for example. As them to write down as many links to physics and physics skills they can think of.

Career linking challenge: Ask mentees to think of a job which is **not** linked to physics. If anyone in the group can think of **any** links to physics or physics skills, then they “win” and share the way in which it is linked. Because the job **is** linked to physics, another mentee must then have a go at thinking of a job which is not linked to physics. Hopefully, the aim of this activity is to demonstrate that all jobs are linked to physics in some way.

## Skills used and possible relevant careers

The skills listed in the video include:

* Communication – with a variety of group sizes, being part of a working community,
* Team working and leadership
* Using specialist equipment and technology
* Working to pressure and deadlines, time keeping
* Attention to detail - Using exact measurements
* Problem Solving
* Analysis and Analytical skills
* Creativity

Skills used in the session activity:

* Problem Solving: In taking in evidence from the videos and making informed hypotheses and theories. This could be relevant to any career. The ability to take a problem and explore options and solutions is present also in our day to day lives.
* Communication: written communication on the worksheet and in the chat and sharing and articulating theories to other members in the group as well as explaining your own thought process. This is critical in any job, and was listed by every member of the video as a key skill. Other careers where you have to justify your actions (like healthcare, or business models) or have to show your train of thought to others (like law, or scientific research), or just have to be really good, like retail/sales! Justification through verbal reasoning is very important and can cause big decisions to be made in many, *many* fields of work.

A key point of this session is broadening what classes as a Physics career, and looking for ways in which physics skills can be useful in a very wide range of careers. Further examples of more traditional Physics careers can be found online through the following resources:

* NUSTEM Careers postcards for careers in Physics and Maths - <https://nustem.uk/careers-postcards/>
* Prospects career planner - <https://www.prospects.ac.uk/planner>
* WISE campaign My Skilly My Life (requires sign-up) - <http://www.myskillsmylife.org.uk/>

## Catering for inclusion

### Ethos

This planned session links to the second half of the Physics Mentoring ethos:

“*Physics is also key to unlocking transferrable skills, such as problem-solving, critical reasoning and numeracy, which can increase a person's enjoyment, safety and belonging in society and increase economic benefit. Physics skills can lead to an immeasurable number of careers and jobs, in a wide variety of fields.*”

Through the session we are aiming to highlight the skills which link to physics careers and motivate our mentees to identify ways in which they could harness physics skills and follow physics-related careers. We want to motivate our mentees to see themselves as people who can bring benefit and be successful in any field of their choice and understand the ways in which studying physics can help them realise success in this way.

### Physical Environment

Access to devices – Some students may not be accessing the session on a laptop/desktop, possibly accessing on a phone or tablet. This may cause difficulties with viewing videos, particularly if audio cannot be accessed. It might also cause difficulty with interactivity with the group if mentees cannot access a keyboard. Communication around this is encouraged – be sure to check in each session about technology and make it clear if anything special is required. It might be that mentees are not using the same device each session.

Students may also not be able to watch the live broadcast and will need to watch a recording and contribute later so this should be considered when broadcasting and posting.

### Expectations and Opportunities

Growing your group dynamic - You will have gained some knowledge about the group dynamics in your sessions so far but be aware not to make assumptions on how different mentees will act. Ensure you are not allowing the same students to dominate.

Confidence in a group/opportunity to ask questions – A virtual mentor means that every interaction from the mentees is intentional, relatively public and recorded (to ask a question, they need to say it in front of everyone or put it into a permanent group chat, which they may not like if they think it is a silly question…) and they can’t message you privately. The process for asking questions should be considered and there should be many opportunities to ask questions and make contributions through different mediums. If some students are consistently not interacting, think of ways you can encourage them to do so in a way which feels safe to them – this could include asking teachers for advice on encouraging interaction from particular mentees.

### Learners’ skills and abilities

Understanding careers and jobs – it is important to be clear with explanations and consider students understanding of job roles and working environments. Ensure that students understand what a role entails and link the roles to their day-to-day life and lived experiences.

### Sensory attitudes

Utilising different mediums (discussion, video reading, reflecting) in this session will hopefully encompass all learning preferences. If required, the worksheet activity could be adapted into a discussion.

*The above is by no means exhaustive but a starting point for consideration!*

## Measuring success

* Did the mentees engage with the icebreaker activity?
* Did the mentees watch the video and engage with the activity? Were the students disengaged or confused? If they were confused, did they ask for clarification?
* Can all mentees list at least 4 careers that studying physics can lead to? Can they explain why this role links to physics?
* Did all mentees provide an example of a career they would like to do, and successfully link it to physics?
* How rich is the reflection? Does it illustrate an understanding of the benefits of reflecting? Did they use opinions, or just state what happened?
* Did they provide any gauge of their interest/excitement/surprise in the reflection sheets?

## Increasing Science Capital Dimensions

Post some follow up thoughts in the channel which reflects on the session and possibly elaborates on some of the below/take homes for the students in an accessible way – using examples from the session where possible. Some of these examples can be alluded to in the session too.

### Science literacy

The Where Physics Can Take Me video has key scientific words highlighted throughout. You could increase the science literacy of your students by providing them with the list of these words and checking their understanding of each. If they do not know any of the words already, then you could discuss their meanings and check understanding in a following session.

### Science-related attitudes, values, and dispositions

By broadening the range of careers that mentees see as linked to physics, this session should increase the relevance that mentees see physics having to their day-to-day life.

### Knowledge about the transferability of science

The Where Physics Can Take Me video shows individuals with a physics background going into a broad range of careers – not just those which are science related. Focus on the skills that the featured individuals have and encourage mentees to make links across the different jobs.

### Consumption of science-related media

Students could be encouraged to look out for jobs in the media that they consume and link them to physics. Additionally, some of Jon Chase’s Science Communication YouTube videos might be appropriate for the mentees to follow up with: <https://rapscience.co.uk/science-raps/>

### Participation in activities, in and out of school

If a student has identified a job or career that they would really like to pursue through this session, you could suggest they speak to their school careers adviser to arrange some work experience.

### Family science skills, knowledge and qualifications/Knowing people in science-related roles/Talking about science in everyday life

A key focus of this session is the re-framing of jobs and careers that the students already know – from not being associated with physics to being associated with it. Mentees might like to reflect on people that they know who might be in a science-related job e.g. do they know someone who works in a hospital, but had previously not connected that to science?

Mentees could be encouraged to have conversations about careers with friends and family. Do they know what science-related qualifications and jobs their family members have?